

Appl. No. 09/518,697  
Reply to Office Action of February 17, 2004

Attorney Docket No. 28207.3  
Customer No. 27683

**Amendments to the Claims:**

1. (Currently Amended) A computer-implemented automated building design and modeling system comprising:

a spatial database;

means for defining parametric objects wherein each of the parametric objects represents a construction component of a building being modeled and together the parametric objects describe information sufficient for assembly of a complete building model for the building's construction as constrained by the input of selected client requirements, and further wherein each of the parametric objects includes an interface through which the parametric object communicates information with other parametric objects;

a user interface for user input of selected client requirements to specify a configuration of the building model; and

means for initiating automatic assembly of the building model utilizing the defined parametric objects, whereby the parametric objects for the building model are created in the spatial database and customized based upon the client requirements entered via the user interface; and whereby the parametric objects communicate information via their interfaces to accurately assemble the building model.

2. (Previously Presented) The system of claim 1 further comprising means for creating a comparison representation of selected information pertaining to variations of the assembled building model.

3. (Previously Presented) The system of claim 2 wherein said comparison representation is created by:

saving the results of an initial assembling of the building model that utilizes an initial value for at least one selected parameter of the building;

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changing the initial value for the at least one selected parameter by a selected amount,  
reassembling the building model, and saving the new results;  
repeating the changing, reassembling, and saving for a selected number for variations of  
the building model; and  
outputting a comparison representation of selected information for the reassembled  
building models represented by the saved results.

4. (Currently Amended) The system of claim 1 ~~wherein the parametric objects further describe construction cost information, the system further comprising means for creating a cost estimate for the building model, wherein the parametric objects further describe construction cost information.~~

5. (Currently Amended) The system of claim 1 ~~wherein the parametric objects further describe construction schedule information, the system further comprising means for creating a construction schedule for the building model, wherein the parametric objects further describe construction schedule information.~~

6. (Currently Amended) A computer-implemented automated building design and modeling system comprising:

a spatial database;

means for defining parametric objects wherein each of the parametric objects represents a construction component of a building being modeled and together the parametric objects describe information sufficient for assembly of a complete building model for the building's construction as constrained by the input of selected client requirements, and further wherein each of the parametric objects includes an interface through which the parametric object communicates information with other parametric objects;

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a user interface for user input of selected client requirements to specify a configuration of the building model; and

means for initiating automatic assembly of the building model utilizing the defined parametric objects, whereby the parametric objects for the building model are created in the spatial database and customized based upon the client requirements entered via the user interface; and whereby the parametric objects communicate information via their interfaces to assemble the building model.

~~The system of claim 1~~ wherein said objects comprise ordinary elements and massing elements, said massing elements being capable of placing instances of other objects into the spatial database and subsequently passing data thereto and receiving data therefrom.

7. (Original) The system of claim 6 wherein said ordinary elements and massing elements are assembled into said building model according to a sequential assembly hierarchy.
8. (Original) The system of claim 6 wherein said means for initiating automatic assembly comprises a massing element.
9. (Original) The system of claim 6 wherein said user interface comprises a dialog box.
10. (Original) The system of claim 6 wherein each of said massing elements comprises:  
means for detecting a physical clash between an existing instance of an object and an instance of an object currently being placed by said massing element; and  
means for avoiding the detected physical clash by automatically relocating said instance of an object currently being placed according to predefined placement rules.
11. (Cancelled)

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12. (Currently Amended) The system of claim 43 wherein said saved results are provided to said user in the form of a graph.
13. (Cancelled)
14. (Cancelled)
15. (Currently Amended) A computer program product, comprising:  
a computer program processable by a computer system for causing the computer system to:  
  
create instances of parametric objects in a spatial database, wherein each of said parametric objects represents a construction component of a structure to be modeled and includes a user interface for enabling a user to input design data to said parametric object;  
and  
  
initiate automatic assembly of said parametric objects to create a building model;  
and  
apparatus from which the computer program is accessible by the computer system  
wherein said objects comprise ordinary elements and massing elements, said massing elements being capable of placing instances of other objects into the spatial database and subsequently passing data thereto and receiving data therefrom.
16. (Original) The computer program product of claim 15 wherein said computer program further causes the computer system to create a graphical representation of said building model.
17. (Original) The computer program product of claim 16 wherein said graphical

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representation is selected from the group consisting of design development drawings, specifications, construction drawings, shop drawings, and details.

18. (Original) The computer program products of claim 15 wherein said computer program further causes the computer system to create a cost estimate for said structure from said building model.

19. (Original) The computer program product of claim 15 wherein said computer program further causes the computer system to create a construction schedule for said structure from said building model.

20. (Cancelled)

21. (Currently Amended) The computer program product of claim ~~20~~ 15 wherein said ordinary elements and massing elements are assembled into said building model according to a sequential assembly hierarchy.

22. (Original) The computer program product of claim 15 wherein said user interface comprises a dialog box.

23. (Currently Amended) The computer program product of claim ~~22~~ 15 wherein each of said massing elements comprises:

computer program code for detecting a physical clash between an existing instance of an object and an instance of an object currently being placed by said massing element; and

computer program code for avoiding the detected physical clash by automatically relocating said instance of an object currently being placed according to predefined placement

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rules.

24. (Original) The computer program product of claim 15 wherein said computer program further causes the computer system to:

- initially assemble said building model using an initial value for at least one selected parameter of said structure;
- save results of said initial assembling;
- increment said initial value by a selected amount;
- reassemble said building model using said incremented initial value for said at least one selected parameter;
- save results of said reassembling;
- repeat said incrementing, reassembling and saving results of said reassembling until a value for said at least one selected parameter is equal to a selected final value; and
- provide said saved results to a user.

25. (Original) The computer program product of claim 24 wherein said saved results are provided to said user in the form of a graph.

26. (Currently Amended) A computer program product, comprising:  
a computer program processable by a computer system for causing the computer system  
to:  
create instances of parametric objects in a spatial database, wherein each of said  
parametric objects represents a construction component of a structure to be modeled and  
includes a user interface for enabling a user to input design data to said parametric object,  
and  
initiate automatic assembly of said parametric objects to create a building model.

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~~The computer program product of claim 15~~ wherein one of said objects is a grouping massing element, said grouping massing element specifying parametric behavior required of objects that it assembles in said building model, which objects may be either parametric or non-parametric.

27. (Original) The computer program product of claim 15 wherein each of said objects includes an internal interface for enabling said object to interact with other ones of said objects.

28. (Currently Amended) A method of implementing a computer-implemented automated building design and modeling system, the method comprising:

defining parametric objects wherein each of the parametric objects represents a construction component of a building being modeled and together the parametric objects describe information sufficient for assembly of a complete building model for the building's construction as constrained by the input of selected client requirements, and further wherein each of the parametric objects includes an interface through which the parametric object communicates information with other parametric objects;

inputting selected client requirements to specify a configuration of the building model;  
and

automatically assembling the building model utilizing the defined parametric objects, whereby the parametric objects for the building model are created in a spatial database and customized based upon the inputted client requirements; and whereby the parametric objects communicate information via their interfaces to accurately assemble the building model.

29. (Previously Presented) The method of claim 28 further comprising generating a comparison representation of selected information pertaining to variations of the assembled building model.

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30. (Previously Presented) The method of claim 29 wherein said representation is created by:  
saving the results of an initial assembling of the building model that utilizes an initial value for at least one selected parameter of the building;  
changing the initial value for the at least one selected parameter by a selected amount, reassembling the building model, and saving the new results;  
repeating the changing, reassembling, and saving for a selected number for variations of the building model; and  
outputting a comparison representation of selected information for the reassembled building models represented by the saved results.
31. (Previously Presented) The method of claim 28 wherein the parametric objects further describe construction cost information, the method further comprising creating a cost estimate for said structure from said building model.
32. (Previously Presented) The method of claim 28 wherein the parametric objects further describe construction cost information, the method further comprising creating a construction schedule for said structure from said building model.
33. (Currently Amended) A method of implementing a computer-implemented automated building design and modeling system, the method comprising:  
defining parametric objects wherein each of the parametric objects represents a construction component of a building being modeled and together the parametric objects describe information sufficient for assembly of a complete building model for the building's construction as constrained by the input of selected client requirements, and further wherein each of the parametric objects includes an interface through which the parametric object communicates information with other parametric objects;



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inputting selected client requirements to specify a configuration of the building model;  
and  
automatically assembling the building model utilizing the defined parametric objects,  
whereby the parametric objects for the building model are created in a spatial database and  
customized based upon the inputted client requirements; and whereby the parametric objects  
communicate information via their interfaces to accurately assemble the building model.  
The method of claim 28 wherein said objects comprise ordinary elements and massing elements,  
the method further comprising said massing elements placing instances of other objects into the  
spatial database and subsequently passing data thereto and receiving data therefrom.

34. (Original) The method of claim 33 wherein said ordinary elements and massing elements  
are assembled into said building model according to a sequential assembly hierarchy.

35. (Currently Amended) The method of claim 28 ~~33~~ wherein said inputting is performed  
utilizing a user interface that comprises a dialog box.

36. (Previously Presented) The method of claim 33 further comprising, for each object that is  
created in the spatial database:

detecting a physical clash between an existing instance of an object and an instance of an  
object currently being placed by said massing element; and

avoiding the detected physical clash by automatically relocating said instance of an object  
currently being placed according to predefined placement rules.

37. (Original) The method of claim 28 further comprising:

initially assembling said building model using an initial value for at least one selected  
parameter of said structure;

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saving results of said initial assembling;  
incrementing said initial value by a selected amount;  
reassembling said building model using said incremented initial value for said at least one selected parameter;  
saving results of said reassembling;  
repeating said incrementing, reassembling and saving results of said reassembling until a value for said at least one selected parameter is equal to a selected final value; and  
providing said saved results to a user.

38. (Original) The method of claim 37 wherein said saved results are provided to said user in the form of a graph.

39. (Cancelled)

40. (Cancelled)

41. (Previously Presented) The system of claim 2 wherein the variations of the assembled building model relate to the building's orientation on its site and the selected information of the comparison representation illustrates the building cost for each such variation in building orientation.

42. (Previously Presented) The method of claim 29 wherein the variations of the assembled building model relate to the building's orientation on its site and the selected information of the comparison representation illustrates the building cost for each such variation in building orientation.

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43. (New) The method of claim 1 wherein the information sufficient for assembly of a complete building model for the building's construction comprises building code information.

44. (New) The method of claim 1 wherein the information sufficient for assembly of complete building model for the building's construction comprises manufacturer's specifications for the objects.